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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/435,766	11/08/99	KUSHIDA	T 104361

EXAMINER	
LOKE, S	
ART UNIT	**PAPER NUMBER**
2811	

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DATE MAILED: 03/02/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/435,766	Applicant(s) Kushida
	Examiner Loke	Group Art Unit 2811

☒ Responsive to communication(s) filed on *Dec 26, 2000* .

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) *1-10, 12, and 14-19* is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☒ Claim(s) *1-4* is/are allowed.

☒ Claim(s) *5-10, 12, and 14-19* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☒ The proposed drawing correction, filed on *Dec 26, 2000* is ☒approved ☐disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) _____ .

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____ .

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

1. Claims 5-10, 12, 14 and 15 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification never discloses the embodiment of fig. 5 can be combined with the embodiments of figs. 7C and 8. Therefore, the specification never discloses the claimed invention as claimed in claims 5-10.

The specification never discloses a depletion layer forms over the entire channel region sandwiched between the gate region when a zero bias is applied to the gate region and the source region is located substantially at a center of the channel region as claimed in claim 12.

The specification (page 9, lines 15-33) discloses p- type channel region instead of the n- type channel region 436 can be used in the device of fig. 11B. The specification never discloses an impurity concentration in the channel region (second conductive type) is equal to or less than an impurity concentration in the cathode region (first conductive type) as claimed in claim ~~12~~ 14.

The specification never discloses the anode electrode would form a Schottky junction with the second conductive type channel as claimed in claim 15.

2. Claims 9, 10, 12, 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 9, line 4, claim 10, lines 4-5, "distance of the gate region" is unclear whether it is being referred to "gate distance".

In claim 12, line 9, "the insulation film" has no antecedent basis.

In claim 14, line 3, it is unclear how a channel region disposed on the channel region.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

4. Claim 14 insofar, as incompliance with 35 USC 112, is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Williams et al. (U.S. patent no. 6,078,090).

Williams et al. shows all the elements of the claimed invention in figs. 11 and 12. It comprises: a cathode region [118] having a first conductive type; a channel region [114] disposed on the cathode region [118] , the channel region [114] having a second conductive type different from the first conductive type; an anode region [116] disposed on the channel region [114]; an impurity concentration in the channel region [114] is less than an impurity concentration in the cathode region [118].

5. Claim 16 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Terasawa.

Terasawa shows all the elements of the claimed invention in fig. 5. It is a bipolar semiconductor device, comprises: an electrode [48]; a p-type region [21] and an n- type region

[12] formed on the electrode [48]; a channel region having an n conductivity type formed on the n-type region [12] when the transistor is in an on-state; a trench type insulated gate electrode [15] provided so as to surround at least a part of the channel region; an n+ type region [46] formed on the n-type channel region when the transistor is in the on-state; an electrode [47] connected to the n-type region [46]; an n-type semiconductor layer [25], located between the n-type region [46] and the electrode [47], and an end face of the semiconductor layer [25] is extended to a position covering at least a portion of the gate region [15].

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Terasawa.

In regards to claim 17, it would have been obvious to have an insulating film formed on the upper portion of the gate region because it insulates the gate electrode from the active semiconductor region. It would have been obvious for the thickness of the insulating film formed on an upper portion of the gate region is thicker than a thickness of an insulating film formed on a side portion of the gate region because it depends on the threshold voltage of the device.

In regards to claims 18 and 19, it would have been obvious to have the insulating film and the contact opening of the claimed invention because it depends on the electrode contact resistance of the device.

8. Applicant's arguments filed 12/26/00 have been fully considered but they are not persuasive.

It is urged, in page 7 of the remarks, that the specification (page 5, lines 16-29) discloses the claimed subject matters of claim 12. However, the specification (page 5, lines 16-29) is directed to the embodiment of fig. 1C. It is not directed to the embodiment of fig. 10B (claim 12).

9. Claims 1-4 are allowed.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Loke whose telephone number is (703) 308-4920.

sl

February 27, 2001

Steven Loke
Primary Examiner

Steven Loke